BIOLOGICAL EVALUATION
Western Spruce Budworm Infestation
in Southeast Idaho and Northwest Wyoming
1978

Forest Insect and Disease Management
State and Private Forestry
U. S. Forest Service
Ogden, Utah

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INTRODUCTION

For more than two decades the western spruce budworm, Choristoneura occidentalis Free., has been epidemic in mixed conifer stands in portions of southeastern Idaho and northwestern Wyoming (Figure 1). During the last decade, defoliation recorded during the annual detection survey has averaged approximately 104,000 acres. The largest amount of visible damage, amounting to 346,800 acres, was recorded in 1978 (Table 1). The most persistent and widespread outbreaks have occurred on the Bridger-Teton National Forest while the Targhee National Forest has experienced several major fluctuations. Major infestations on the Caribou National Forest have been less frequent and until this year the average yearly recorded defoliation amounted to less than 6,000 acres.

During 1978 changes in the extent and intensity of budworm defoliation occurred throughout the outbreak area. On the Targhee National Forest, approximately 47,000 acres of new infestation occurred in stands located between Teton Pass and Packsaddle Creek to the northwest.

On the Caribou National Forest, new defoliation was recorded on 38,000 acres. New infestations, recorded for the first time in the Grand Teton National Park, occur in several stands along a major travel route through the Park. In addition, the long-standing infestations on the Targhee and Bridger-Teton expanded into uninfested stands. Distinct from this expansion in area, the Targhee and Bridger-Teton infestations also significantly increased in defoliation intensity.

In addition to the annual egg mass survey conducted to provide a defoliation prediction for the 1979 season, impact data was collected from 18 selected stands. Data included standard tree and stand measurements, radial growth, top kill, and current defoliation. The data were collected and analyzed according to a procedure developed by Region 1 as part of the Canada/U.S. Spruce Budworm Program.

TECHNICAL INFORMATION

INSECT: Western spruce budworm, Choristoneura occidentalis Free.

HOST TREES: Douglas-fir, Pseudotsuga menziesii (Mirb.)

1/ By Lawrence E. Stipe, Ogden Field Office, Forest Insect and Disease Management, U. S. Forest Service, Ogden, Utah.

In addition, increment cores and tree height were collected from the first five host and nonhost trees on each variable plot.

Branch samples were collected as part of a West-wide program designed to improve egg mass sampling as a predictive tool. These data are included to give an estimate of the future trend of these infestations and the level of tree damage expected. Samples were taken from permanent three-tree clusters that had been previously established in areas with budworm defoliation. These samples, consisting of two 70-cm branches, were cut from mid crown position on opposite sides of each of the three trees (six branches per cluster). These branches were individually labeled, bagged and shipped to the Forest Insect and Disease laboratory in Ogden, Utah. Each branch was carefully examined and all egg masses were removed and tallied by cluster.

RESULTS AND DISCUSSION

TARGHEE NATIONAL FOREST

The original green stand (live trees before the infestation) for the ten stands examined on the Targhee National Forest averaged 328 trees per acre (Table 2). The species composition includes Douglas-fir (71 percent), subalpine fir (18 percent), Engelmann spruce (3 percent) and lodgepole pine-aspen (8 percent). Approximately 99 percent or 299 of the 303 host trees per acre have been damaged to some extent by the budworm. Defoliation, top kill and mortality were heaviest in the understory. Nearly 36 trees per acre of the Douglas-fir understory were killed while only 3 trees per acre were killed in the 5 to 11.9-inch dbh category and no mortality occurred in the trees above 12 inches dbh. These data suggest that tree damage and mortality increase as tree size decreases. Individual stand data are summarized in Tables 3 through 12.

The actual mean periodic annual increment for trees 5 inches dbh and larger for the ten stands on the Targhee National Forest was 38.01 (cu.ft. vol/acre/yr.) for Douglas-fir, 7.6 for subalpine fir and 3.7 for spruce (Table 22). For the four years of this infestation, these figures represent an annual growth loss of 7.8 percent, 16.0 percent and 13.8 percent, respectively. Stands with high egg mass counts were generally those with the largest percentage of growth reduction. These data, not correlated by way of a rigid analyses, support the rationale that growth loss is heaviest in areas where populations and subsequent defoliation is the highest. This same relationship also holds true with degrees of defoliation and the amount of top kill observed.

Egg mass data indicate that defoliation will be, at least, moderate to heavy in most stands in the West and East Divisions on the Targhee.

No trend samples were collected during 1977 in the South Division. Since much of this infestation area was new in 1978, the populations are expected

CARIBOU NATIONAL FOREST

Egg mass and stand data were not collected on the Caribou due to bad weather and a lack of personnel near the end of last field season. Following two years of no visible defoliation, over 38,000 acres were detected in 1978. Much of this was in stands infested for the first time in many years. Without additional information, the trend and intensity of this infestation in 1979 is unknown. One might speculate it will continue, but fluctuations have been common on the Caribou (Table 1). This is the first time there has been an increase of this magnitude.

SURVEY COSTS SUMMARY

Aerial Survey

Aircraft - Targhee	$ 4,280.00
- Bridger-Teton (Park)	4,420.00
- Caribou	2,160.00
Observer Salary	1,530.00
Travel and per diem	450.00
	$12,840.00

Stand Impact Evaluation

Vehicles	$ 4,550.00
Field Crew Salaries	1,434.00
Equipment	350.00
Travel and per diem	4,290.00
Contributed by YACC	1,996.00
	$12,620.00

Egg Mass Evaluation

Field Crew Salaries	$ 4,360.00
Lab Crew Salaries	2,075.00
Travel and per diem	2,110.00
Equipment	350.00
Contributed by YACC (field)	450.00
Contributed by YACC (lab)	580.00
	$ 9,925.00

TOTAL SURVEY	$35,385.00

RECOMMENDATIONS

1. Forest Insect and Disease personnel should conduct aerial detection and egg mass surveys in all major infestation areas. New egg mass

A P P E N D I X

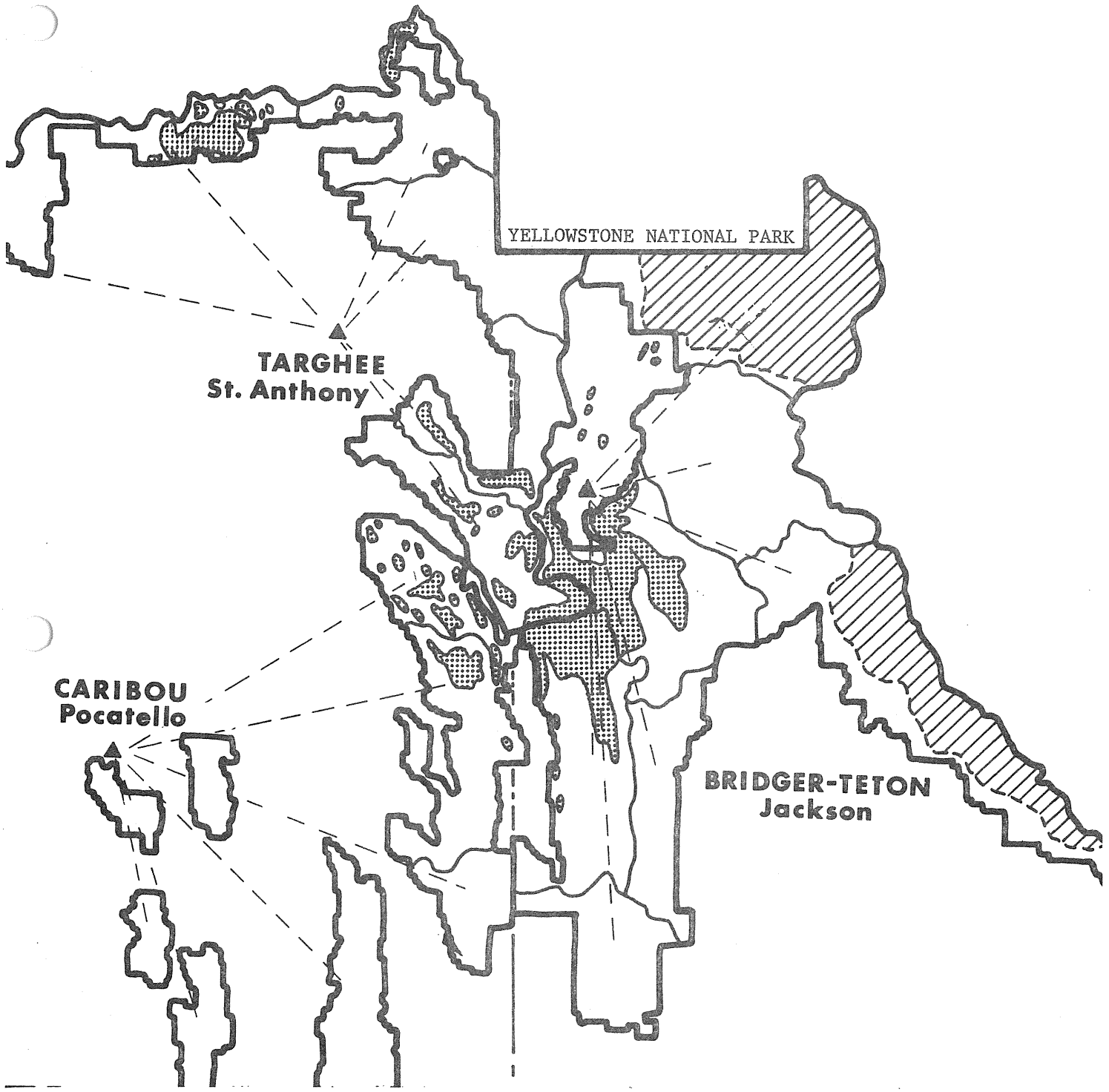

FIGURE 1. Known distribution of western spruce budworm during the last two decades on the Targhee, Bridger-Teton and and Caribou National Forests.

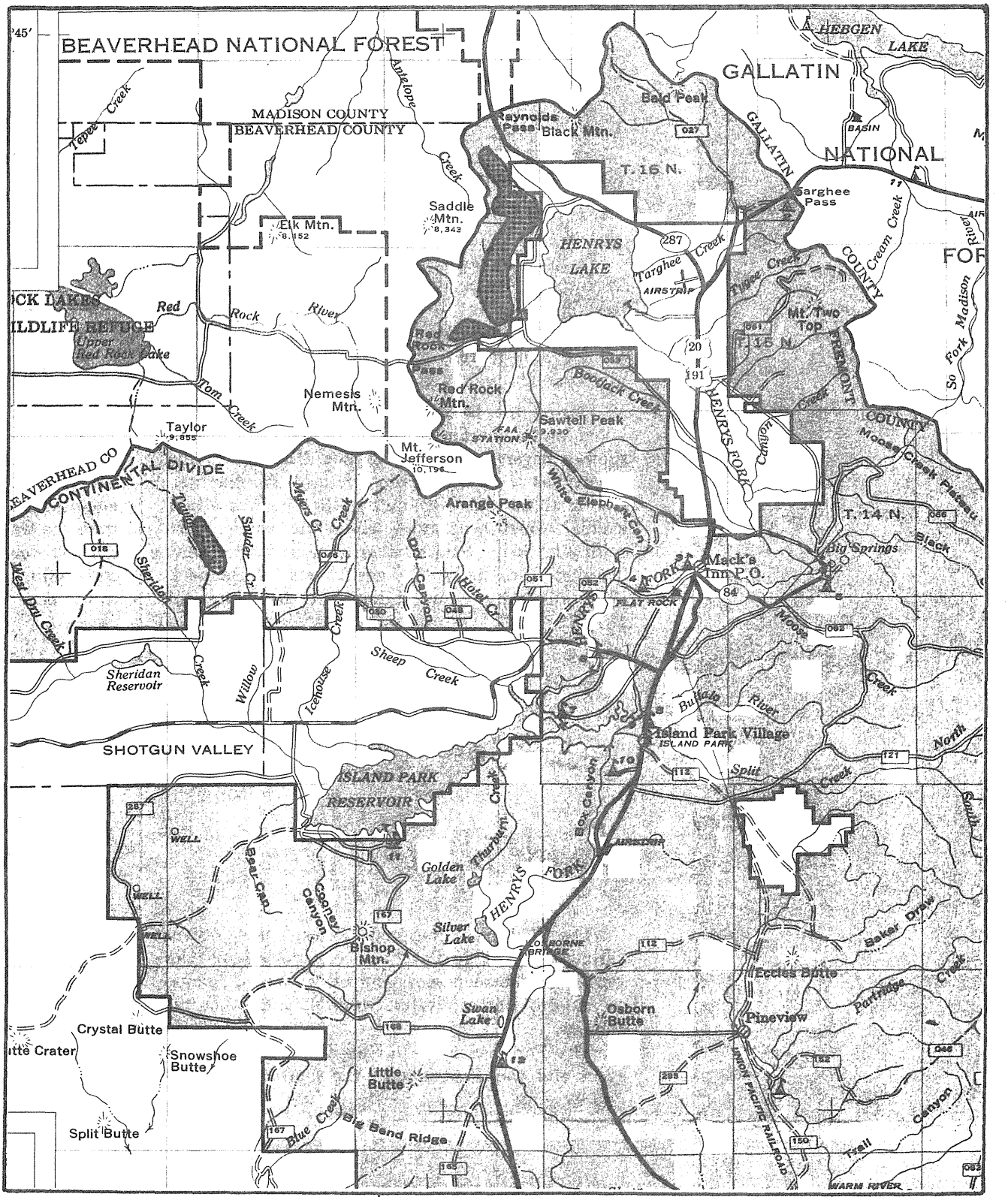

FIGURE 3. Distribution of western spruce budworm defoliation on the Targhee National Forest (East Division) 1978.

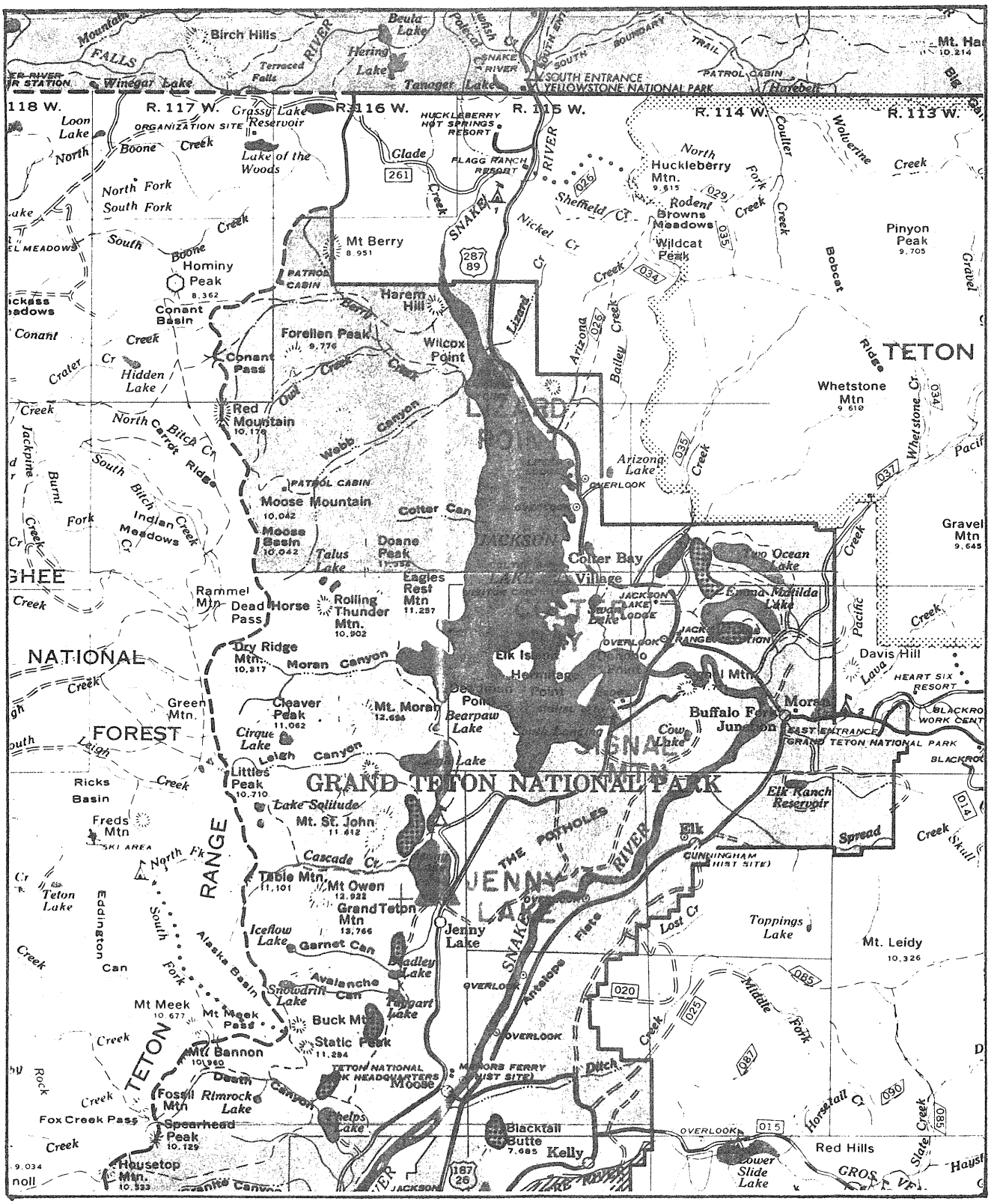

FIGURE 5. Distribution of western spruce budworm defoliation in Grand Teton National Park, 1978.

Snake River
Observation Peak 9972
Wolf Mtn 2491
Red Pass
Lake Basin
Indian Peak 9683
TARGHEE N F
Deadhorse Peak 9760
Red Peak 9790
Ferry Peak 9598
Long Spr Can
SUMMER HOMES
4 H CAMP
GRAND
Wolf CANYON
Sheep Gulch
Jordan Can
Bleacher Mountain
PALISADES RES
Snake Cr
Sawpit Creek
Hoback
Martin Cr
Pow Wow Point
Sour Dough Creek
Stinking Springs
Beaver Mountain
BRYAN FLAT
HOBACK CANYON
Battle Mtn
Red Creek
Lime Creek
Buck Cr
TETON CO
LINCOLN CO
Ramshorn Peak 10,292
Lick Cr
Adams Cr
Shepard Creek
SUBLETTE CO
Cliff Creek
Little Cliff Creek
Munroe Creek
Halfturn Cr
Fullturn Creek
Clause Peak 10,579
Gibbs Burnt Cr
Clause Cr
Sandy
Cabin Cr
Greyback Ridge
Wyoming Range
Phosphate Creek
Hunter Creek
Big Sprs Creek
Willow Creek
Cliff Creek Falls
Cliff Creek Pass
Pickle Pass
Hole in the Wall Creek
Bondurant Creek
Hoback Peak 10,864
Kilgore Creek
Bare Hole Cr
Creased Creek
Jamb Creek
Roosevelt Meadows
Greys River
Upper Hoback Canyon
Fourth Creek
Third Cr
Second Cr
First Cr
Cascade Cr
Grizzly Creek
South Fork Hoback
Lookout Mountain
Silver Mine Creek
North Horse Mtn.
Mule Creek
Rowdy Creek
Corlos Cr
Park Cr
Chair Creek
South Fork
Gunsight Pass
Prospect Hill 9675
Mt Dougal
Dead Cow Cr
Horse Creek
McDougal Gap
McDougal Cr
Shoberg Cr
Nylander Creek
Cottonwood Creek
Hardin
Buck Cr
Sheep Creek
North Twin Cr
South Twin
Bug Cr
Cabin Creek Peak 10,236
Cabin Cr
Upper Greys River
Bear Creek
Bear Trap Gulch
Dutson Can
Pine
Turnerville
Willow Cr
North Fork
Steves Canyon
The Narrows
Suter Can
Dry Fork
Water Can
W Fk
Spring Cr
Toms Can
Martha
Jensen Cr
NF
CARIBOU
S Fk Mill Cr
Thayne
Bedford
Herman Canyon
Strawberry
Haystack Mountain 10,104
Burnt Hollow
Res
Dry Creek
Lost Creek
Virginia Peak
Sherman Peak
Meadow
Henderson Creek
Anderson Creek
Pearsond Creek
Deadman Cr
Deadman Peak 10,365
Telephone Pass
Lost Creek
Lost Lake
Prater Mountain 10,108
Prater Can
Green Can
Lee Creek
Wolfey Can
Etna
STAR VALLEY
SALT RANGE
SALT RIVER
LINCOLN CO
Freedom
North Branch
South Branch
Cedar Creek
Man Peak
White Creek
Star Peak
Corral Can
Stewart Creek
Dry Creek
Birch Cr
Call Cr
Fawn Creek
Dead Cr
Beaver Creek
Little Blind Creek
South Fork
Trail
Meadow Cr
Cabin Cr
Lower
Mosby Cr
Blind Cr
Bear Creek
Greys River
Roosevelt Meadows
Deadman Cr
Silver Mine
Lookout Mountain
Gunsight Pass
Mt Dougal
McDougal Gap
Prospect Hill 9675
Horse Creek
Dead Cow Cr
Shoberg Cr
Nylander Creek
Cottonwood Creek
Hardin
Buck Cr
Sheep Creek
North Twin Cr
South Twin
Bug Cr
Cabin Creek Peak 10,236

Year	ACRES DEFOLIATED BY FOREST			Total
	Targhee	Bridger-Teton[1/]	Caribou	
1965	97,900	10,000	0	107,900
1966	14,600	33,800	0	48,400
1967	10,000	54,900	100	65,000
1968	17,000	109,800	6,000	132,800
1969	1,800	80,800	500	83,100
1970	12,400	68,400	100	80,900
1971	9,800	30,600	100	40,500
1972	3,600	62,000	1,000	66,600
1973	0	0	0	0
1974	1,500	18,900	0	20,400
1975	36,900	119,200	300	156,400
1976	41,200	141,200	0	182,400
1977	13,800	52,600	0	66,400
1978	105,760	199,550	38,150	343,460

[1/] Includes Grand Teton National Park.

Table 1. Acres of western budworm-caused defoliation from 1965 to 1978 as recorded during insect aerial detection surveys in Region 4.

COMBINED TARGHEE (10 Stands)

Species	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	134.8	--	27.7	11.6	53.7	40.5	13.5	2.4	35.6
	5 - 11.9	69.3	0.8	11.4	22.7	31.5	15.8	2.3	1.1	2.8
	12 - up	30.1	0.5	5.0	13.4	10.8	6.1	0.4	>0.1	--
Alpine fir	0 - 4.9	44.4	--	8.6	9.2	23.9	20.6	2.4	1.2	--
	5 - 11.9	12.6	--	1.3	2.9	7.4	5.1	--	--	0.3
	12 - up	2.0	--	0.8	0.7	0.4	0.3	--	--	--
Engelmann Spruce	0 - 4.9	6.8	3.0	3.1	--	--	--	--	--	--
	5 - 11.9	2.1	--	0.7	1.1	0.4	0.1	0.2	--	--
	12 - up	0.5	--	--	0.3	0.2	0.3	--	--	--
	0 - 4.9	10.2	10.2							
	5 - 11.9	13.3	13.3							
	12 - up	1.7	1.7							
STAND TOTAL		327.8	29.5	59.4	61.8	128.3	88.8	18.9	4.8	38.6

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 2. Combined stand structure and composition by damage category from ten stands on the Targhee National Forest, 1978.

WEST RATTLESNAKE CREEK

Species	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	180.00		120.00	15.00	45.00	15.00			
	5 - 11.9	105.04		15.26	51.64	35.66	11.33			2.48
	12 - up	31.62		4.47	18.67	8.48	1.08	0.87		
Alpine fir	0 - 4.9									
	5 - 11.9									
	12 - up									
Engelmann Spruce	0 - 4.9									
	5 - 11.9									
	12 - up									
	0 - 4.9									
	5 - 11.9									
	12 - up									
STAND TOTAL		316.66		139.73	85.31	89.14	27.41	0.87	--	2.48

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 4. Stand structure and composition by damage category in trees per acre in west Rattlesnake Creek on the Targhee National Forest, 1978.

PLEASANT VALLEY

Species	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	240.00				120.00	90.00			120.00
	5 - 11.9	114.55		7.60	32.19	69.12	36.65	3.97	6.29	5.64
	12 - up	23.52		0.70	15.37	7.45	11.84			
Alpine fir	0 - 4.9									
	5 - 11.9									
	12 - up									
Engelmann Spruce	0 - 4.9									
	5 - 11.9									
	12 - up									
	0 - 4.9									
	5 - 11.9									
	12 - up									
STAND TOTAL		378.07	--	8.30	47.56	196.57	138.49	3.97	6.29	125.64

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 6. Stand structure and composition by damage category in trees per acre in Pleasant Valley on the Targhee National Forest, 1978.

TIMBER CREEK

Species	DBH Size Class (inches)	Original[1] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	240.00	--	36.00	24.00	60.00	48.00	60.00	24.00	84.00
	5 - 11.9	78.22	1.73	26.27	28.44	6.56	47.51	2.31	--	13.99
	12 - up	22.09	1.07	11.88	7.96	1.17	5.41	1.36	--	--
Alpine fir	0 - 4.9	228.00		12.00	60.00	156.00	108.00	24.00	12.00	
	5 - 11.9	46.14		3.59	3.29	39.25	35.70			
	12 - up	3.58			2.48	1.10	1.88			
Engelmann Spruce	0 - 4.9	--								
	5 - 11.9	4.69			1.11	3.58	1.11	2.47		
	12 - up	1.51				1.51	1.51			
Lodgepole Pine and Aspen	0 - 4.9	72.00	72.00							
	5 - 11.9	29.75	29.75							
	12 - up	1.02	1.02							
STAND TOTAL		726.99	105.57	89.74	127.28	269.17	249.12	90.14	36.00	97.99

[1] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 8. Stand structure and composition by damage category in trees per acre in Timber Creek on the Targhee National Forest, 1978.

RED ROCK PASS

Species	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	45.00				45.00	15.00			
	5 - 11.9	65.65	1.49	15.86	28.13	20.18	11.55			
	12 - up	34.87	0.34	7.79	17.59	9.15	3.54	0.54	0.18	
Alpine fir	0 - 4.9									
	5 - 11.9	2.86			2.86		2.86			
	12 - up									
Engelmann Spruce	0 - 4.9	45.00	30.00	15.00						
	5 - 11.9	16.60		7.05	9.55					
	12 - up	3.44			3.44		1.15			
Aspen	0 - 4.9									
	5 - 11.9	1.66	1.66							
	12 - up									
STAND TOTAL		215.08	33.49	45.69	61.57	74.33	34.11	0.54	0.18	

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 10. Stand structure and composition by damage category in trees per acre in Red Rock Pass on the Targhee National Forest, 1978.

DOG CREEK

Species	DBH Size Class (inches)	Original Green[1/]	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	157.89		31.58	31.58	63.16	63.16			31.58
	5 - 11.9	34.06	2.01		11.79	20.26				
	12 - up	6.83		0.28	2.86	3.70				
Alpine fir	0 - 4.9	47.37		15.79	31.58		15.79			
	5 - 11.9	35.71			16.92	16.24	3.92		1.69	2.55
	12 - up	4.74		1.04	1.10	2.59				
Engelmann Spruce	0 - 4.9	15.79		15.79						
	5 - 11.9									
	12 - up									
Lodgepole Pine	0 - 4.9	15.79	15.79							
	5 - 11.9	85.84	85.84							
	12 - up	3.75	3.75							
STAND TOTAL		407.77	107.39	64.48	95.83	105.95	82.87	--	1.69	34.13

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 12. Stand structure and composition by damage category in trees per acre in Dog Creek on the Targhee National Forest, 1978.

SQUAW CREEK

Species /	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	180.00		30.00	45.00	75.00	45.00			30.00
	5 - 11.9	45.70			3.09	25.68	4.56	2.21		16.94
	12 - up	32.11		1.23	4.22	25.27	6.35		0.65	1.39
Alpine fir	0 - 4.9	15.00				15.00	15.00			
	5 - 11.9	24.78				24.78	10.62			
	12 - up	0.84				0.84	0.84			
Engelmann Spruce	0 - 4.9	30.00				30.00	15.00			
	5 - 11.9	7.66			6.14	1.52				
	12 - up	4.07			2.87	1.20				
	0 - 4.9	--								
	5 - 11.9	22.01	22.01							
	12 - up	3.20	3.20							
STAND TOTAL		365.37	25.21	31.23	61.32	199.28	97.37	2.21	0.65	48.33

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 14. Stand structure and composition by damage category in trees per acre in Squaw Creek on the Bridger-Teton National Forest, 1978.

PRITCHARD PASS

Species	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	91.30			52.17	39.13	13.04			
	5 - 11.9	39.37		9.98	22.79	6.61				
	12 - up	6.01			2.03	3.98	0.71			
Alpine fir	0 - 4.9	78.26		13.04	65.22		13.04			
	5 - 11.9	28.31		10.39	17.92		2.26			
	12 - up	2.61			2.61					
Engelmann Spruce	0 - 4.9	13.04			13.04					
	5 - 11.9	9.21		6.13	3.08					
	12 - up									
Lodgepole Pine	0 - 4.9	91.30	91.30							
	5 - 11.9	58.91	58.91							
	12 - up	4.89	4.89							
STAND TOTAL		423.21	155.11	39.54	178.86	49.72	29.06			

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 16. Stand structure and composition by damage category in trees per acre in Pritchard Pass on the Bridger-Teton National Forest, 1978.

WEST BAILEY CREEK

Species	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	94.74		31.58	31.58	31.58	15.79			
	5 - 11.9	27.68		1.39	3.19	23.10	8.48			
	12 - up	19.19			10.19	9.00	0.87	1.60	0.94	
Alpine fir	0 - 4.9	47.37		15.79	15.79	15.79	15.79			
	5 - 11.9	57.25		5.13	10.55	36.21	38.81	8.92		
	12 - up	4.26				4.26	1.25	0.98		
Engelmann Spruce	0 - 4.9									
	5 - 11.9									
	12 - up									
Lodgepole Pine	0 - 4.9	94.74	94.74							
	5 - 11.9	10.94	10.94							
	12 - up	3.96	3.96							
STAND TOTAL		360.12	109.64	53.89	71.29	119.95	80.99	11.50	0.94	

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 18. Stand structure and composition by damage category in trees per acre in West Bailey Creek on the Bridger-Teton National Forest, 1978.

GAME CREEK

Species	DBH Size Class (inches)	Original[1/] Green	Remaining Green	Light Def.	Moderate Def.	Heavy Def.	Light Top Kill	Moderate Top Kill	Heavy Top Kill	Mortality
Douglas-fir	0 - 4.9	315.79			15.79	189.47	110.53	15.79		94.74
	5 - 11.9	158.90			29.38	118.01	38.98	4.05		11.52
	12 - up	27.40			9.20	15.98	7.64			0.91
Alpine fir	0 - 4.9									
	5 - 11.9									
	12 - up									
Engelmann Spruce	0 - 4.9									
	5 - 11.9									
	12 - up									
	0 - 4.9									
	5 - 11.9									
	12 - up									
STAND TOTAL		502.09	--	--	54.37	323.46	157.14	19.84	--	107.16

[1/] The original green stand totals represent the number of trees per acre and not the total of the individual damage categories since each tree can have more than one damage rating.

Table 20. Stand structure and composition by damage category in trees per acre in Game Creek on the Bridger-Teton National Forest, 1978.

Forest/Location	Douglas-fir		Subalpine fir		Spruce	
	PAI[1/]	% Loss	PAI	% Loss	PAI	% Loss
Targhee West						
Van Noys	37.98	16.4				
West Rattlesnake	58.08	2.6				
East Three Mile	40.20	2.2				
Pleasant Valley	40.37	14.3				
Targhee East						
Kelly Creek	34.57	2.2	11.40	6.2		
Timber Creek	21.94	17.5	8.61	17.9	1.60	24.4
Gillan Creek	45.78	10.1				
Red Rock Pass	34.52	3.1	0.89	38.2	5.80	3.1
Upper Kelly Creek	28.66	2.0	9.58	1.8		
Targhee South						
Dog Creek	No Samples					
Combined Targhee	38.01	7.8	7.6	16.0	3.7	13.8
Bridger-Teton						
Squaw Creek	19.6	25.1	5.76	0	5.09	0
Trail Creek	8.62	4.9	18.57	5.0		
Pritchard Pass	16.50	1.0	9.58	2.5	1.70	0
Bryan Flat	26.50	9.8	3.20	8.1		
West Bailey Creek	13.87	6.4	9.15	21.6		
Deer Creek	37.72	56.7	2.26	0		
Game Creek	No Samples					
Snow King	No Samples					
Combined Bridger-Teton	20.5	17.3	8.1	6.2	3.4	0

[1/] Periodic annual increment.

Table 22. Summary of radial growth and percent growth loss caused by the spruce budworm on the Targhee and Bridger-Teton National Forests.

TARGHEE NATIONAL FOREST (East Division)

CLUSTER LOCATION	# Egg Masses Per Cluster			Predicted (1979)	
	1976	1977	1978	Def. %	Damage Category
Blue Creek	0	0	0	--	--
Dry Creek	0	1	3	23	Moderate
Dry Fork	1	1	9	28	Heavy
Jessey Creek	0	2	10	27	Moderate
Keg Creek	2	1	4	24	Moderate
Kelly Creek	19	12	24	41	Heavy
Lower 191	2	0	4	24	Moderate
Lower Dry Creek	2	2	0	--	--
Lower Targhee Creek	7	1	7	26	Heavy
Lower Willow Creek	NS[1/]	0	2	22	Light
Raynold's Pass	26	13	23	38	Moderate
Red Rock Pass	6	5	6	26	Moderate
Sawtell Road	0	--	5	24	Moderate
Targhee Creek	2	1	1	21	Light
Taylor Creek	--	0	1	21	Light
Timber Creek	59	18	NS	--	--
Twin Creek	--	3	1	21	Light
Upper 191	5	3	3	23	Moderate
Upper Blue Creek	1	4	2	22	Light
Upper Dry Fork	5	2	3	23	Moderate
Upper Kelly Creek	7	1	20	39	Heavy
Upper Red Rock Pass	2	0	1	21	Light
Upper Targhee Creek	4	3	0	--	--
Upper Sawtell Road	0	0	0	--	--
Willow Creek	1	2	2	22	Light
Mean	6.1	3.0	5.5	24.9	Moderate

[1/] No sample collected.

Table 24. Egg mass trend by cluster for 1976, 1977, and 1978, predicted defoliation level (%) and predicted damage category for 1979 on the East Division, Targhee National Forest.

BRIDGER-TETON NATIONAL FOREST

CLUSTER LOCATION	# Egg Masses Per Cluster			Predicted (1979)	
	1976	1977	1978	Def. %	Damage Category
Astoria Hot Springs	28	2	13	30	Heavy
Bull Hollow	25	4	43	52	Very Heavy
Deer Creek	27	21	91	87	Very Heavy
Fall Creek	29	29	29	47	Very Heavy
Game Creek	62	23	54	73	Very Heavy
Higby Creek	30	18	16	36	Heavy
Horse Creek	61	14	3	23	Moderate
Lower Cache Creek	38	34	2	22	Light
Lower Leeks Canyon	23	24	127	100	Very Heavy
Mill Creek	10	32	69	71	Very Heavy
Miller Creek	49	2	66	83	Very Heavy
North Fork Murphy Creek	10	21	43	56	Very Heavy
Palmer Creek	11	2	28	46	Very Heavy
Porcupine Creek	58	78	80	92	Very Heavy
Radio Point	58	56	56	66	Very Heavy
Rogers Gulch	28	23	32	49	Very Heavy
Roos Creek	59	11	67	73	Very Heavy
Snow King	78	57	39	58	Very Heavy
Squaw Creek	23	28	39	51	Very Heavy
Twin Creek Ranch	27	28	88	91	Very Heavy
Upper Cache Creek	30	1	21	38	Heavy
Upper Leeks Canyon	77	58	NS[1/]	--	--
Upper West Bailey Creek	53	23	65	86	Very Heavy
West Bailey Creek	43	8	79	83	Very Heavy
Willow Creek	38	12	61	73	Very Heavy
Wilson Canyon	83	69	89	85	Very Heavy
Berts Hollow	NS	16	44	59	Very Heavy
Cabin Creek	NS	6	2	22	Light
East Table Creek	NS	23	40	51	Very Heavy
Grizzly Basin	NS	--	3	23	Moderate
Martin Creek	NS	56	NS	--	--
Near Dog Creek	NS	7	8	28	Heavy
Red Creek	NS	6	24	42	Heavy
Stinking Springs	NS	30	64	81	Very Heavy
Trail Creek	NS	5	30	58	Very Heavy
Upper Porcupine Creek	NS	41	59	74	Very Heavy
Mean	40.7	23.3	46.3	59.6	Very Heavy

[1/] No sample collected.

Table 27. Egg mass trend by cluster for 1976, 1977, and 1978, predicted defoliation level (%) and predicted damage category for 1979 on the Bridger-Teton National Forest.